

received his chief education at the University of Göttingen, and in early life came to England. After that time he successively held the post of assistant to the late Prof. Johnston at Edinburgh, Professor of Chemistry in the Royal Agricultural College at Cirencester, and Professor of Chemistry to the Royal Agricultural Society of England, and was well known as the author of several works in theoretical and agricultural chemistry, such as the "Chemistry of Food" and the "Chemistry of Manure."

THE *Journal of Botany* for December contains a memoir of the late George Benthams, accompanied by an excellent photograph.

WE have received the prospectus of the Royal Agricultural College, Cirencester, issued during the past month. The course of instruction provided in technical and scientific subjects appears to be ample for the requirements of the agricultural students. We are glad to notice that external examiners are appointed for the final examination of students for the diploma, and also that a Board of Studies, in which are several professors otherwise unconnected with the College, exists. The number of students is steadily increasing, and among them are several Indian scholars sent by the Governments of Bengal and the North-West Provinces. The Governments of the Indian Presidencies also encourage some of their civil servants to pass through the College course when on leave of absence in this country.

ON the subject of agricultural education, a correspondent writes to the *Times* that a number of meetings have recently been held in Oxfordshire and Buckinghamshire with a view to the establishment of night classes during the winter for teaching the scientific principles of agriculture. There is, he says, a growing opinion among the more educated young men that agriculture requires something besides Commissions and inquiries and fair trade. It has been estimated that the annual waste from careless and unskilful methods of managing manure amounts to nearly five millions sterling. Add to this the want of knowledge in the purchase of artificial manures and their application, the waste of feeding-stuffs, the odd pieces and corners of fields that might grow other things beside rank weeds and couch-grass, and the waste of time in going to markets, auctions, and fairs. No reduction of rent or local taxation, or increased price of wheat, will, says this correspondent, do anything for men who make no effort to improve their industry by increased scientific knowledge. The natural history of the wire-worm, the leather-jacket, the dissolving of bones, the building up of plants, the judicious mixing of food, and many other things which farmers would be the better for knowing can never be acquired by what is called practical farming, and accordingly these classes are commended to the consideration of all who take an interest in the welfare and education of young men in rural districts.

THE additions to the Zoological Society's Gardens during the past week include a Yellow Baboon (*Cynocephalus babouin* ♂), a Chacma Baboon (*Cynocephalus porcarinus* ♀) from the East Coast of Africa, presented by Capt. Edward Jones, R.N.R.; a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mr. Geo. Airey; a Bittern (*Botaurus stellaris*), British, presented by Mr. Robert Page; a — Otter (*Lutra* —) from South America, a Cat Fish (*Amblyurus catus*) from North America, deposited; two Rock Pipits (*Anthus obscurus*), British, a Passerine Owl (*Glaucidium passerinum*), a Crested Titmouse (*Parus cristatus*) from Siberia, purchased.

OUR ASTRONOMICAL COLUMN

WOLF'S COMET.—Herr Lehmann-Filhés of Berlin has made a first approximation to the amount of perturbation experienced by this comet at its near approach to the planet Jupiter in 1875, to which attention was directed in NATURE (vol. xxx. p. 615).

He adopts the orbit determined by Prof. Krueger upon observations extending over an interval of forty-eight days, and applies the formulæ of the "Mécanique Céleste" (liv. ix. chap. ii.), which were first employed by Burckhardt in the case of the celebrated Lexell comet of 1770. The following are the elements deduced for perihelion passage in 1868, or the elements defining the orbit of the comet previous to its close approach to Jupiter; we annex Prof. Krueger's orbit for the present appearance for comparison:—

	Lehmann-Filhés, 1868	Krueger, 1884
Perihelion passage ... Sept. 24 ^h 6 ^m M.T. Berlin ... Nov. 17 ^h 79 ^m 22 ^s		
Perihelion 352° 36' 48" 19° 3' 17"		
Ascending node 207° 33' 50" 206° 22' 17"		
Inclination 27° 36' 49" 25° 15' 10"		
Angle of excentricity 16° 11' 5" 34° 3' 12"		
Log. semi-axis major 0.663970 0.552936		
Mean daily motion 358" 14 525" 536		

The longitudes in both orbits are reckoned from the mean equinox 1884^o.

Prof. Krueger writes modestly as to the degree of accuracy of his elements, which have been adopted by Herr Lehmann-Filhés, nevertheless they were founded upon a fairly-wide interval of observation as noted above. From the nature of the problem, however, the orbit for 1868 must be regarded as roughly indicating the kind of track which the comet was then following. And it is to be remarked that the perihelion distance corresponding to the assigned values of excentricity and semi-axis major is 3.327, which would account for such a comet not having been observed while moving in the orbit of 1868. Thus, as in several previous cases, the comet appears to have been brought within range of visibility from the earth by the powerful attraction of the planet Jupiter.

THE WASHBURN OBSERVATORY, WISCONSIN.—Vol. ii. of *Publications* of this Observatory has been issued. Its main feature consists in a reduction of the star-gauges of Sir William Herschel, published and unpublished, or 683 gauges published and 405 unpublished, Prof. Holden having been indebted for the latter to Lieut.-Col. Herschel, R.E., who forwarded to him a complete copy of a manuscript, by Miss Caroline Herschel, in which they are given, and who was at the further trouble of extracting from the Herschel papers in the library of the Royal Astronomical Society the dates of the various sweeps. Also of 500 counts of stars from the published charts of Prof. C. H. F. Peters, 983 counts from his unpublished charts and those of Watson and Chacornac, and 781 from those of Palisa. Prof. Holden states that he is now discussing these various gauges by a graphical process, and that they promise to lead to very interesting results, especially when they are supplemented by other star-gauges covering the same ground and made by a larger instrument. The volume further contains a list of 111 new double-stars and two new nebulae, with observations of red or coloured stars between December 1881 and the end of 1883, in continuation of a list given in the first volume.

GEOGRAPHICAL NOTES

REPORTS have been received from M. Alfred Marche, who is travelling through the Philippine Archipelago on a scientific mission for the French Ministry of Public Instruction. During June and July last he explored the archipelago of Calamianes, situated to the south-west of Mindoro and to the north of Paluan (Paragua) Island. This archipelago is composed of three large islands, Busuanga, Calamianes or Culion, and Linacapan, and about thirty smaller ones. M. Marche first visited Culion, the inhabitants of which are Tagbannas, similar to those whom he observed in a previous journey to Paluan. These form the principal as well as the most ancient people of the peninsula, and it is probable that formerly they occupied a much larger area than they do now. A small number of them, more or less Christianised, have submitted and built a village, to which, however, they come as rarely as possible. The others are independent, and are fetish-worshippers. In Culion there is but a single Spaniard, the priest. After Culion, M. Marche visited the island of Busuanga, where there were formerly Chinese colonies engaged in collecting birds' nests, and in trepang and pearl-fishing, both industries which no longer exist. In spite of continual rains the traveller was able to make a large collection of plants and of woods of all kinds. In Busuanga he came

across the inhabitants of Agutayo, one of the Cuyos Islands. They left their home, where they could hardly get enough to bring them to Busuanga, to fish for trepang and for small prawns, which they dried in the sun, and then sold to Chinese and Indians. M. Marche was able to take measurements of a certain number of these Agutaino. He gives long and interesting ethnographical details of the Tagbannas of this island, on their marriage ceremonies, funeral rites, &c. M. Marche then went in succession to the islands of Penon, Coron, Magao-Puyao, and Dibatac. In the last he observed that the hills, which are almost disafforested by the natives, and which are about two hundred metres in height, surround fertile plains in the form of a horse-shoe, more or less closed, and in the centre a depression is observable. The whole has the appearance of a funnel, and it is suggested that this is an extinct volcanic region. In the same island of Dibatac, crocodiles and boa-constrictors are very numerous, and M. Marche was able to capture one of the latter, which had swallowed a calf several months old.

ON the 2nd inst. Mr. H. M. Stanley inaugurated the newly-formed Scottish Geographical Association in the Music Hall, Edinburgh. Lord Balfour of Burleigh presided. On the 4th Mr. Stanley formally opened the rooms of the Society, and on Saturday last he opened the Dundee branch of the Scottish Geographical Society in the Kinnaird Hall.

M. ROMANET DE CAILLAUD has communicated to the Geographical Society of Paris two papers on Tonquin. One refers to routes from the delta of the Red River into Yunnan, the other on the history of the Thai or Laos race in Tonquin and Southern Kwangsi. In the former he describes in detail five routes, two by river and three by land, into South-Western China. The only one of these of importance is that by the Songkoi, or Red River, and M. de Caillaud makes light of its difficulties, and insists that Paris is practically nearer to the Yunnan frontier than either Canton or Peking. Paris is at the most, he says, fifty days' journey, while Canton is sixty, and Hankow, on the Yang-tse, eighty days. He also advocates this route for an invasion of China, and says that Lao-kai, on the upper Songkoi, is really for France the vulnerable point of that Empire. As has been already pointed out, discussion of the Songkoi route above Hong-hoa must for the most part be based on speculation, as only one European has travelled down or up the river from or to Manhao, and his journey was undertaken in circumstances which hardly admitted of accurate observation. A German geographer has recently expressed the opinion that one of the chief difficulties to be encountered in this route will be ethnological, and M. de Caillaud, in his second paper, traces briefly the fortunes of the principal race of the region—the Laos or Thai. This people has apparently had its day. At one time it dominated the whole Indo-Chinese peninsula, but now it is split up among a number of independent or semi-independent princelets, whose main business is war and piracy. Their various attempts to recover a portion of their old power have been repressed by the Annamites, assisted, when necessary, by the Chinese.

LIEUT. BOVE, of the Italian Navy, has written to Dr. Hyades of Paris a letter respecting his second expedition to Terra del Fuego. The first, he says, was to some extent scientific. He was ordered by the Argentine Government to study the south of Patagonia and Terra del Fuego from an economical point of view, and scientific observations were merely adjuncts. Nevertheless a scientific commission to investigate the geology, botany, zoology, and hydrography of these regions was sent with him. Lieut. Bove's official report is about to appear in Spanish in Buenos Ayres, and will be accompanied by those of the scientific men engaged. The *Bollettino* of the Italian Geographical Society will contain a paper on his journey in the interior of Terra del Fuego among the Ona. He started from Ouchonaya with an escort of twenty-four Fuegians of the mission, who proved very useful to him. After crossing the mountains behind this place, he descended into the valley which runs down to Admiralty Sound. He describes the interior of the island as magnificent, and much richer than Patagonia. The Ona were met with but twice, and their total number is estimated at from 300 to 400. The total number of Fuegians in the whole archipelago is stated, according to a careful census made by an English missionary, the Rev. Thomas Bridges, to be only 949 men, women, and children.

M. MICHEL VENUKOFF has addressed a note to the Geographical Society of Paris, referring to a new map of the island of Saghalin, prepared by M. Nikitine, the topographer. It

differs from all the other maps of the island in some respects. It shows it to be considerably larger than had been previously believed. M. Reclus gives the area as 63,600 square kilometres. M. Strelbitsky 67,018, and Venukoff 73,529. Although the writer claims that his bases for calculation were necessarily more detailed and exact than those of his predecessors, he nevertheless considers his figures as approximate rather than final.

SCIENTIFIC ASPECTS AND ISSUES OF THE INTERNATIONAL HEALTH EXHIBITION¹

[THE first Wednesday lecture at the Society of Arts was devoted to an address on this subject—in accordance with precedents—the Duke of Buckingham, Chairman of the Exhibition Council, taking the chair. The following are the parts of the address relating to the scientific departments of the Exhibition, and the proposal which the lecturer is understood to have laid before the Council for some time for the disposal of the surplus to such objects.]

There was only one exhibit in the food department to which I would specially call attention, it was that from the collections of the Science and Art Department and the Parkes Museum, illustrating the constituents of food and food values, and the connected exhibit by the Society of Public Analysts, of materials used as adulterants of articles of food; of adulterated articles of food commonly sold in this country; of adulterations which have been suppressed; of adulterations practised abroad, and mixtures generally protected by labelling. This latter was added in consequence of a suggestion made by the late Mr. Wigner, President of the Society of Analysts, at a late date in the progress of the Exhibition. I am afraid that it did not attract all the attention that it deserved. I trust, however, we shall be able to reserve it for continual public reference. Mr. Wigner, in communicating with me, pointed out that, although the Exhibition was most successfully arranged so as to display in a prominent manner all the articles connected with food, yet the public were only shown what is done by the most careful and respectable firms, whose names are a sufficient guarantee that only materials of the highest quality are used in the preparation of the goods which they show.

All who are connected with food produce know how, from time to time, the desire on the part of the consumer for cheap goods is the cause of the introduction of articles called "substitutes," which are offered to the manufacturer at one-third the price of the genuine material, and which frequently consist of some cheap and simple preparation, the very opposite in its chemical character to the article for which it is said to be an efficient substitute: several cases of this kind had recently been brought to Mr. Wigner's notice. For instance, he referred to an article to be used as a substitute for tartaric acid, the composition of which has been found to be acid sulphate of alumina in solution—a substance which, if introduced into the manufacture of bread or biscuits, is as objectionable as alum, and quite as much an adulterant. Bisulphate of potash is also sold under a name similar to tartaric acid, and is equally as worthless as sulphate of alumina. These are only two instances out of many, and serve as an additional argument to show the keen competition in trade, which causes the manufacturer to produce, and unscrupulous firms to sell, such articles under "Royal Letters Patent," or some other heading of this sort, to attract the notice of the consumer.

The public analyst, Mr. Wigner added, although, of course, he should be cognisant of these facts, has quite enough work for the remuneration paid to him, and in addition to this, there is the fact that the Sale of Foods and Drugs Act is so limited in its aim and scope as to practically prevent the analyst from testing anything but the common articles of food, such as bread and milk, unless they are sold under some recognised name. Let him once travel outside these lines, and a whole host of objections are raised. What is really wanted is more stringent legislation, similar in character to that at present in operation in the United States and Paris.

In the French Section were shown the monthly reports of the Municipal Laboratory, showing the complete and thorough manner in which the food-supply of that city is protected. Why cannot something of the same sort be done in London? What is wanted is a measure defining what is and what is not adulteration, and prohibiting the use of articles which are fre-

¹ Extracts from an Address delivered at the Society of Arts on Wednesday, November 26, by Mr. Ernest Hart, Member of the Executive Council.